

## **Appendix A Screening Process**

### **Technology Screening Process**

Traditional energy storage technologies, such as pumped hydroelectric storage and compressed air energy storage, require large sites that are seldom available near the point of need and have negative environmental and financial impacts (Energy Vision 2020). As TVA's peak demands continue to grow, the need for energy storage will only increase. Therefore, TVA initiated a tailored collaboration with the Electric Power Research Institute (EPRI) to study available energy storage options. The purpose of this study was to evaluate which technology currently in the process of being commercialized would most likely provide the lowest cost of operation on a life-cycle-cost basis for multi-hour utility energy storage, while still providing other energy storage services that have economic value to electric utilities. Included in this study were Vanadium Redox Batteries (VRB), zinc bromide batteries, and Regenesys™ flow batteries. Regenesys™ was identified as meeting all of these requirements.

The EPRI report identified zinc-bromide batteries as the second choice for storage technology. However, this technology is only developed for short duration, small-scale discharges (25 kW for 4 hours) and requires electrolytes that are twice the cost per kilowatt of those used for Regenesys™ technology. At the time of the report, the developer was focusing only on this small-scale unit with no plans for larger scale plants. Consequently, only Regenesys™ technology was considered for this project.

### **Substation Screening Process**

The initial universe of locations considered for the reference plant installation were current or future substation locations identified on the basis of potential deferred costs, in relation to transmission line and/or substation upgrades, resulting from the reference plant or a future generation unit being constructed there. This group is comprised of locations where TVA's Transmission Power Supply (TPS) organization has projects planned to improve service to customers through additional delivery points or to improve system stability.

All potential substations were evaluated with regard to suitability for the reference plant and/or future replication of the technology once field proven. A brief description of these categories and sites associated with each are as follows:

1. Substations that qualified for the reference plant and have sufficient TVA-owned lands on-site (at least 4 acres) in Tennessee are Burlison/Covington, Birdstown, and Clarksburg; and in Mississippi are North Sardis and Leake.
2. Substations which qualified for the reference plant and have good potential for land acquisition nearby in Tennessee are Clifton City, Jacks Creek, and White Bluff; in Mississippi Columbus and Bruce; as well as Cadiz, Kentucky, and Breman, Alabama.
3. Substations, which did not qualify for the initial reference plant but could serve as a site for future replication of the technology in Tennessee, are Bon Aqua, Coles Ferry, Pandora, and Casson Lane; as well as Young Cane, Georgia.

4. Substations that presented special problems for either the initial reference plant or replication plant because of space limitations are in Tennessee; namely, Waverly, North Waverly, McEwen, Ashland City, and Estill Springs.
5. Substations that did not qualify for the project are Triune in Tennessee, Charleston, Mississippi, and The University of Mississippi, Oxford, Mississippi.

The substations that fell into categories 1 or 2 were then evaluated for their accessibility from an international airport. Close proximity to an airport enables ease of visitation by representatives who would like to cooperate with TVA in construction and operation of the reference plant, or who may be purchasing the technology once fielded by TVA. A 90-mile circle around Memphis and Nashville, Tennessee; Jackson, Mississippi; and Birmingham, Alabama was constructed to identify substations for the reference plant within an acceptable driving distance for visitors. All substations were within the minimum 90-mile distance with the exception of Clarksburg (96 miles from Nashville, Tennessee) and Columbus Air Force Base (100 miles from Birmingham, Alabama). These two substations were not eliminated in that they were only nominally further than the other sites.

To meet the underlying goal of this project and demonstrate the widest range of potential benefits of the Regenesys™ technology, the site chosen must need frequency regulation and voltage support, currently show a need for transmission upgrades (rated by projected costs associated with upgrades), have end users with a need for premium power, and potential to show significant reduction in frequency and duration of interruptions in service. Therefore, substations were compared based on the potential improvement that could be made in the quality of service provided to a specific customer group. This comparison (Table A-1) quickly revealed that the substation located near Columbus Air Force Base (CAFB) would be a highly desirable choice for installation of the Regenesys™ plant.

**TABLE A-1. RELIABILITY IMPROVEMENT COMPARISON**

<b>Location</b>	<b>Average Interruptions/Yr. (1994-1999)</b>	<b>Cost Savings (\$M)</b>	<b>Need for Reliability/Power Quality* (10 = Greatest Need)</b>
Bremen, AL	4.30	4.5	7
Bruce, MS	2.60	3.0	5
Byrdstown, TN	2.40	3.6	6
Cadiz, KY	3.50	3.2	5
Clarksburg, MS	2.00	1.5	5
Clifton City, TN	12.40	6.2	5
Columbus AFB, MS	25.40	5.0	9
Covington, TN	0.33	2.5	7
Jacks Creek, TN	2.40	3.3	5
Leake, MS	4.30	10.8	4
North Sardis, MS	1.20	0.5	5
While Bluff, TN	2.80	4.4	5

\*As per TPS evaluation based on load mix served (industrial vs. residential)

### **Site Screening Process**

After further investigation and subsequent visits to the substation near CAFB, two possible installation sites were identified on or near the base (Figure 2-1, Chapter 2). One location initially considered for the installation was a privately owned mobile home park adjacent to, and due south of, the existing substation (Alternative A).

Evaluation of this site led to discovery and consideration of a brownfield site located approximately 400 yards west of the substation near the south gate. A wastewater treatment plant (WWTP) was formerly operated by CAFB at this location but has been taken out of service and was recently demolished.

A comparison of these two sites is presented in Table A-2. Based on these results, this environmental review evaluates two sites for implementation of the proposed action; namely, the wastewater treatment plant and the mobile home park.

<b>TABLE A-2. EVALUATION OF SITES</b>		
	<b>Mobile Home Park (Alternative A)</b>	<b>WWTP (Alternative B)</b>
UPS* CAPABILITY	Possible	Possible
POTABLE WATER	Available	Available
SEWAGE	Available	Available
RELOCATION OF PUBLIC	Required	Not Required
NEARBY STRUCTURES	Mobile Homes	Entomology Lab, Hospital, Family Center
TERRAIN	Level and Cleared	Level and Cleared
DRAINAGE	Good	Good
ACCESSIBILITY	New/Improved Access Road Required	Moderate
SCHEDULE REQUIREMENTS	30-Day Public Review Only	Includes required 30-Day Air Force Review in Addition to 30-Day Public Review
FOUNDATION REQUIREMENTS	Less Stringent	More Stringent
SUBSTATION CONNECTION	Direct	Extended Trenching Required

\*Uninterruptible Power Source (UPS)